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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/660,565	09/12/2003	Howard Rhodes	M4065.0570/P570-A	5308
24998	7590	07/07/2006	EXAMINER	
DICKSTEIN SHAPIRO LLP			ARENA, ANDREW OWENS	
1825 EYE STREET NW			ART UNIT	
Washington, DC 20006-5403			PAPER NUMBER	
			2811	

DATE MAILED: 07/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/660,565

Applicant(s)

RHODES ET AL.

Examiner

Andrew O. Arena

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 90 and 93-141 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 90, 93-121 and 130-136 is/are allowed.
- 6) ☒ Claim(s) 122-129 and 137-141 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 January 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 06/22/2006 has been entered.

Specification

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: CMOS imager pixel designs comprising capacitor formed entirely over and within lateral boundaries of field oxide.

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: applicant is required to make appropriate amendment to the description to provide clear support or antecedent basis for the new terms appearing in amended claims 90, 108, and 130 ("lateral boundaries").

Examiner acknowledges support for said terminology in the originally filed disclosure (Figures 3, 10, and 13).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 122-129 are rejected under 35 U.S.C. 102(b) as being anticipated by Rhodes (US 6,204,524).

Regarding claim 122, Rhodes discloses (Fig 6-14) a method of forming an imager (col 8 ln 28-30) comprising the steps of:

providing a semiconductor substrate (116+120; col 8 ln 30-32) having a doped layer (120) of a first conductivity type (col 8 ln 32-33);

forming a field oxide region (115; col 7 ln 25-28) in said semiconductor substrate;

forming a photosensor (Fig 5: 125; col 7 ln 36-37; formed: col 8 ln 45 – col 9 ln 25) including a charge collection region (110) of a second conductivity type (col 7 ln 31-32), said charge collection region being provided in said doped layer (col 7 ln 30-31);

forming a floating (not connected to a fixed potential) diffusion region (155) for receiving charge from said charge collection region (col 7 ln 61-64); and

forming a charge storage capacitor (162; col 9 ln 36-37) over said semiconductor substrate (col 7 ln 66-67) so that one electrode (156) of said storage capacitor is connected directly to said floating diffusion region by an electrical contact (150; col 8 ln 10-13).

Regarding claim 123, Rhodes discloses (Fig 5) the entire extent of said charge storage capacitor overlies said field oxide region (no portion of 162 lies under 115).

Regarding claim 124, Rhodes discloses (Fig 5) the entire extent of said charge storage capacitor overlies an active area of said photosensor (no portion of 162 lies under 125).

Regarding claim 125, Rhodes discloses (Fig 5) said charge storage capacitor is formed partially (col 8 ln 20-21) over said field oxide region (left side of 162) and partially over an active area of said photosensor (right side of 162).

Regarding claim 126, Rhodes discloses (Fig 14) the other electrode (160) of said charge storage capacitor is connected to ground (col 10 ln 25-28).

Regarding claim 127, Rhodes discloses (Fig 5) the other electrode of said charge storage capacitor is connected to a gate of a transistor (there exists a connection pathway from 160 to 108 of 128).

Regarding claim 128, Rhodes discloses (Fig 14) said transistor (ex, 128) is part of a three-transistor cell (ex. 102, 128, 132).

Regarding claim 129, Rhodes discloses (Fig 5) said transistor (ex, 128) is part of a four-transistor cell (ex. 102, 128, 132, 136).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 137-141 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rhodes in view of Lauxtermann (US 2001/0015831).

Regarding claim 137, Rhodes discloses (Fig 6-14) a method of forming an imager (col 8 ln 28-30) comprising the steps of:

providing a semiconductor substrate (116+120; col 8 ln 30-32) having a doped layer (120) of a first conductivity type (col 8 ln 32-33);

forming a field oxide region (115; col 7 ln 25-28) in said semiconductor substrate;

forming a photosensor (Fig 5: 125; col 7 ln 36-37; formed: col 8 ln 45 – col 9 ln 25) including a charge collection region (110) of a second conductivity type (col 7 ln 31-32), said charge collection region being provided in said doped layer (col 7 ln 30-31);

forming a floating diffusion region (130; col 7 ln 41-43) for receiving charge from said charge collection region (col 7 ln 61-64); and

connecting an electrode (156) of a {second} charge storage capacitor (Fig 5: 162; col 9 ln 36-37) to said charge collection region (110) by a {second} electrical contact (150; col 7 ln 61-64).

Rhodes differs from the claimed invention only in not disclosing “connecting an electrode of a first charge storage capacitor to said floating diffusion region.”

Lauxtermann discloses an analogous CMOS imager (¶1) comprising a photosensor (PD; ¶6 ln 5) and a region (55; ¶7 ln 5-7) for receiving charge from said

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photosensor (¶6 ln 7-11) and teaches (Fig 2B) connecting an electrode of a charge storage capacitor (C1) to the region (55).

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Rhodes in view of Lauxtermann by connecting an electrode of a first charge storage capacitor to said floating diffusion region by a first electrical contact (first capacitor will differ from {second} only in being formed above and connected to 130 instead of 155); at least to separate the detection and reading processes (Lauxtermann [0006] ln 17-19).

Regarding claim 138, Rhodes discloses (Fig 5) said first charge storage capacitor is formed such that the extent of said charge storage capacitor overlies said field oxide region (no portion of 162 lies under 115).

Regarding claim 139, Rhodes discloses (Fig 5) a first portion (left side of 162) of said first charge storage capacitor is formed over said field oxide region, and a second portion (right side of 162) of said first charge storage capacitor is formed over an active area of said photosensor (col 8 ln 20-21).

Regarding claim 140, Rhodes discloses (Fig 5) said second charge storage capacitor is formed such that the extent of said charge storage capacitor overlies said field oxide region (no portion of 162 lies under 115).

Regarding claim 141, Rhodes discloses (Fig 5) a first portion (left side of 162) of said second charge storage capacitor is formed over said field oxide region, and a second portion (right side of 162) of said second charge storage capacitor is formed over an active area of said photosensor (col 8 ln 20-21).

Response to Arguments

Applicant's arguments filed 06/22/2006 with respect to claims 90-107, claims 108-121, and claims 130-136 have been fully considered and are persuasive. The rejections of said claims have been withdrawn.

Applicant's arguments filed 06/22/2006 with respect to claims 122-129 have been fully considered but they are not persuasive.

Applicant's argument that "In Rhodes, storage capacitor 162...is connected to...region 155 and not to the floating diffusion region 130" is moot since region 130 has not been relied upon for rejection and since applicant has presented neither claim language nor evidence to distinguish the claimed "floating diffusion region" from region 155 of Rhodes. Floating is interpreted as not connected to a fixed potential.

Applicant's argument that 'no electrode of the storage capacitor 162 of Rhodes is connected directly to a floating diffusion region "by an electrical contact", as in the claimed invention' is not persuasive. Rhodes discloses (Fig 5) that electrode 150 of the charge storage capacitor 162 is connected directly (col 8 ln 10-13) to the floating diffusion region 155 by electrical contact 150.

Applicant's arguments filed 06/22/2006 with respect to claims 137-141 have been fully considered but they are not persuasive.

Applicant's argument that "Rhodes is also silent about connecting an electrode of a {second} charge storage capacitor to [a] charge collection region by a {second} electrical contact" is not persuasive. Rhodes discloses (Fig 5) connecting an electrode

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(156) of a charge storage capacitor (162; col 7 ln 63) to a charge collection region (110; col 7 ln 33-34, ln 60-64) by an electrical contact (150).

In response to applicant's arguments against the references individually ("Rhodes does not disclose...connecting an electrode of a storage capacitor to a floating diffusion region by a first electrical contact" and "Rhodes is also silent about a first charge storage capacitor and a second charge storage capacitor"), one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Allowable Subject Matter

Claims 90-107, 108-121 and 130-136 are allowed.

Conclusion

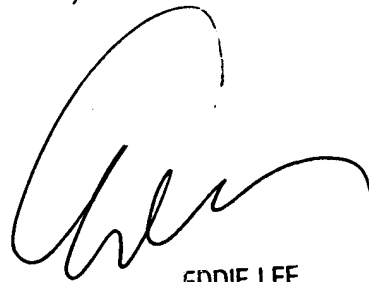
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew O. Arena whose telephone number is (571) 272-5976. The examiner can normally be reached on M-F 8:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (571) 272-1732. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Andrew O Arena
29 June 2006



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